are high, as in large buildings, 1,200 feet per minute can be used without any objectionable results; but where a thorough distribution is desired, and the outlets are placed within 6 feet or 8 feet from the floor, the velocity of air from the outlets should not be greater than 800 feet per minute.

In any shop installation, provision should be made for re-circulating the air, also for the use of cold, fresh air from the outside of the building. Occasionally it is found that a building can be heated easier by using part outside air and part return air than to use all return air. This is accounted for in the following way: Where the fan is blowing into and exhausting from the building as in re-circulating, the pressure maintained in the building is not greater than the outside, so the leakage of air around windows, doors and crevices may be very great, while by the use of a part fresh utside air, a slight pressure can be maintained and to a large extent prevent this inward leakage. In either case cold air will of course be entering the building, but in the latter case the outside air will pass through the heater where it can be heated more economically and easier than by mixing it with the heated air in the building as it leaks in. In some cases it is found difficult to maintain uniform temperature throughout the buildings when using entirely return air, because it is difficult to keep the lower strata of air along the floor sufficiently warm, owing to leakage, though in the upper part of the building the temperature may be as high as 80 or 85 degrees. Because of the influence of local conditions, fan makers hesitate to give out data about their apparatus. The capacity of the steel plate centrifugal exhaust fan (inlet on one side only), when running under "free delivery" will be given approximately, however, by the formula:

$C = 1.57\ D^2WR.$

In which C = capacity in cubic feet per minute. D = diameter of the blast wheel in feet. W = width of the blast wheel at the periphery in feet. R = R.P.M. By "free delivery" is meant to set the fan in the room and simply draw the air into the inlet and discharge into the same room without any piping, thereby avoiding ducts with the attending friction, other than the air passing through the fan. In factory buildings, where short pipes of rather large diameter are used, thus reducing the friction, the formula $C = 1.25\ D^2WR$, will be found to be approximately correct. With long ducts terminating into many small outlets, the capacity will reduce from 10 per cent. to 20 per cent., as given by this last formula. The delivery or capacity of a fan within the limits used in heating, varies directly as the speed of the fan. In a good installation with the fan running with a peripherial velocity of 5,200 feet per minute (approximately one ounce pressure with air at 62 deg.), from 2,200 to 2,500 cubic feet of air per minute will be delivered per horse-power expended.

By proportioning the fan to meet the severest conditions of weather say zero or colder, then in moderate weather of 20 degrees to 25 degrees above zero the fan will do the work easily at three-fourths the speed; the delivery varying with the speed, and the horse-power will be reduced more than one-half, giving 3,850 to 4,300 cubic feet of air delivered per minute per horse-power. As the number of zero days during the winter are comparatively few, it will be found in the majority of cases that the cost of power to run the fans on such days at one ounce pressure is less than the interest on the increased cost of a larger fan designed to operate at a slower speed in the severest weather.

As to whether a steam engine or electric motor is the better for driving the fan depends upon the local conditions. If there is not sufficient exhaust steam to do the heating, an engine-driven fan is the more economical as its exhaust can be used. Fully 75 per cent. of the heat of the steam supplied to the engine is available for heating, as the cylinder condensation and expansion will not amount to more than 25 per cent. An engine-driven fan also has the additional advantage of being independent of the electric plant; so the heating plant can be operated when the electric plant is shut down. Where electric current is constantly available, together with sufficient exhaust steam, an electric motor is the most convenient and economical, as it is probable the electric generating units in such cases are large and consequently more economical than a small steam engine. If the fan apparatus is placed very far from the source of steam supply, the condensation in high pressure steam pipes necessary for an engine is an item well worth saving. Where engines are used, it is preferable to have them direct-connected, but belted electric motors are preferable because of the large and expensive motor necessary for direct-connection of the slow speed of the fan.

The curve shows the horse-power required to move a given volume of air at different velocities or pressures.

Industrial Notes.

Chemical works are being built at Sydney, C.B.

New machinery is being installed in the Arrow Milling Co.'s mill, at Birtle, Man.

A plow company has secured a site on the C.P.R., at Winnipeg, for their works.

The buckle factory recently established at Westport, Ont., has closed, for three months at least.

E. Snider, of Souris, Man., has contracted to erect a flour mill of 100 barrels' capacity at Arcola, Assa.

The Robert Mitchell Co. will probably rebuild their brass works, recently burned, at St. Henri.

The Canadian Thresher Supply Co. has purchased land at Winnipeg for the purpose of erecting a factory.

Orangeville has passed a by-law to give a free site and exemption to the Superior Portland Cement Co.

Alexander & Law Bros. will increase the capacity of their flour mill at Brandon to 500 barrels. It is now 300.

The Western Implement Manufacturing Co. has secured a site in Winnipeg, and will start building operations in the fall.

The business of the Edmonton Iron Works will hereafter be transacted by the Edmonton Iron Working Company. New machinery is being installed.

The International Chemical Congress has adopted a resolution in favor of an international agreement not to use phosphorus in the manufacture of matches.

It is said that the Canadian branch of the big American Steel and Wire Trust will not go to Hamilton after all, but will be at either Humberstone or Welland.

Three mammoth steel elevators, with a storage capacity of approximately 3,500,000 bushels and estimated to cost $750,000, are to be built in Duluth within the next year.

The Yale-Columbia Lumber Co. has commenced the erection of a new sawmill at Cascade, with a daily capacity of 40,000 feet. Dry kilns, planer, trimmers, lath and other machines are to be operated.

F. Skelton, of Cleveland, Ohio, and R. W. Munnell and S. P. Hooper, of Waynesburg, Pa., are looking for a place to establish a shovel factory in Canada, and are thinking of the Miller foundry at Morrisburg.

The name of the Union Furniture and Merchandise Company of Bass River, N.S., has been changed to Dominion Chair Company. The company is in its forty-fourth year. A fine new building has just been occupied.

The Montreal Witness contains an advertisement for a shop superintendent for large bridge building and construction works in England. It is rather remarkable England sending to Canada for such a man.

J. L. Sutherland, a Nova Scotia railway contractor, and another man, were killed by an explosion of dynamite on the Northern Colonization Railway near Montreal. It was caused by the foolish act of a workman, who struck the sticks with an iron bar to dislodge them. Mr. Sutherland has several brothers who are prominent civil engineers, one of them holding a position in the Springhill mines.